

LIST OF THE CLAIMS

1. (Previously presented) An etching method comprising:
preparing a photoresist pattern comprising an ArF photoresist material;
treating the photoresist pattern comprising an ArF photoresist material with
plasma generated by exciting a fluorine-free carbon-containing gas; and
selectively etching an etching target layer by using the plasma-treated photoresist
pattern as an etch mask,
wherein the etching target layer is formed of a material layer selected from a
group consisting of a silicon oxide layer, a silicon nitride layer, a silicon oxynitride layer,
and an organic anti-reflective coating layer.
2. (Original) The method of claim 1, further comprising generating the plasma by
exciting carbon monoxide.
3. (Original) The method of claim 1, further comprising generating the plasma by
exciting carbon dioxide.
4. (Canceled)
5. (Original) The method of claim 1, wherein the etching of the etching target
layer is performed using plasma containing fluorine radicals.

6. (Original) The method of claim 1, wherein the etching of the etching target layer is performed using plasma generated by exciting a fluorocarbon gas.

7. (Original) The method of claim 1, wherein the etching of the etching target layer is performed in a same reaction chamber as the plasma treatment without breaking vacuum.

8. (Original) The method of claim 7, wherein the etching of the etching target layer is performed by applying an RF bias power to a rear surface of the etching target layer, and the plasma treatment is performed by applying no RF bias power or applying a lower RF bias power than the RF bias power applied during the etching of the etching target layer.

9. (Previously presented) An etching method comprising:
preparing a photoresist pattern comprising an ArF photoresist material;
treating the photoresist pattern comprising an ArF photoresist material with plasma generated by exciting a fluorine-free carbon-containing gas; and
selectively etching an etching target layer by using the plasma-treated photoresist pattern as an etch mask,
wherein the etching of the etching target layer is performed using plasma generated by exciting a fluorocarbon gas.

10. (Original) The method of claim 9, further comprising generating the plasma by exciting carbon monoxide.

11. (Original) The method of claim 9, further comprising generating the plasma by exciting carbon dioxide.

12. (Previously presented) An etching method comprising:
preparing a photoresist pattern comprising an ArF photoresist material;
forming a polymer layer comprising carbon on the surface of the photoresist pattern comprising an ArF photoresist material using plasma generated by exciting a fluorine-free carbon-containing gas; and
selectively etching an etching target layer using as an etch mask the photoresist pattern on which the polymer layer is formed,
wherein the etching of the etching target layer is performed using plasma generated by exciting a fluorocarbon gas.

13. (Original) The method of claim 12, wherein the plasma is generated by exciting carbon monoxide.

14. (Original) The method of claim 12, wherein the plasma is generated by exciting carbon dioxide.

15. (Previously presented) An etching method comprising:

preparing a photoresist pattern comprising an ArF photoresist material by optical lithography using an ArF light source;

treating the photoresist pattern comprising an ArF photoresist material with plasma generated by exciting a fluorine-free carbon-containing gas;

selectively etching an etching target layer by using the plasma-treated photoresist pattern as an etch mask; and

removing the remaining photoresist pattern by ashing,

wherein the etching of the etching target layer is performed using plasma containing fluorine radicals.

16. (Original) The method of claim 15, wherein the plasma is generated by exciting carbon monoxide.

17. (Original) The method of claim 15, wherein the etching target layer is formed of a material layer selected from a group consisting of a silicon oxide layer, a silicon nitride layer, a silicon oxynitride layer, and an organic anti-reflective coating layer.

18. (Canceled)

19. (Original) The method of claim 15, wherein the etching of the etching target layer is performed in a same reaction chamber as the plasma treatment without breaking vacuum.

20. (Original) The method of claim 19, wherein the etching of the etching target layer is performed by applying an RF bias power to a rear surface of the etching target layer, and the plasma treatment is performed by applying no RF bias power or applying a lower RF bias power than the RF bias power applied during the etching of the etching target layer.

21. (Previously presented) An etching method comprising:
preparing a photoresist pattern comprising an ArF photoresist material;
forming a polymer layer using plasma generated by exciting a fluorine-free carbon-containing gas, the polymer layer comprising carbon on the surface of the photoresist pattern comprising an ArF photoresist material; and
selectively etching an etching target layer by using the photoresist pattern on which the polymer layer is formed as an etch mask,
wherein the etching of the etching target layer is performed using plasma generated by exciting a fluorocarbon gas.

22. (Canceled)

23. (Original) The method of claim 22, further comprising generating the plasma by exciting carbon monoxide.

24. (Original) The method of claim 22, further comprising generating the plasma by exciting carbon dioxide.

25. (Canceled)